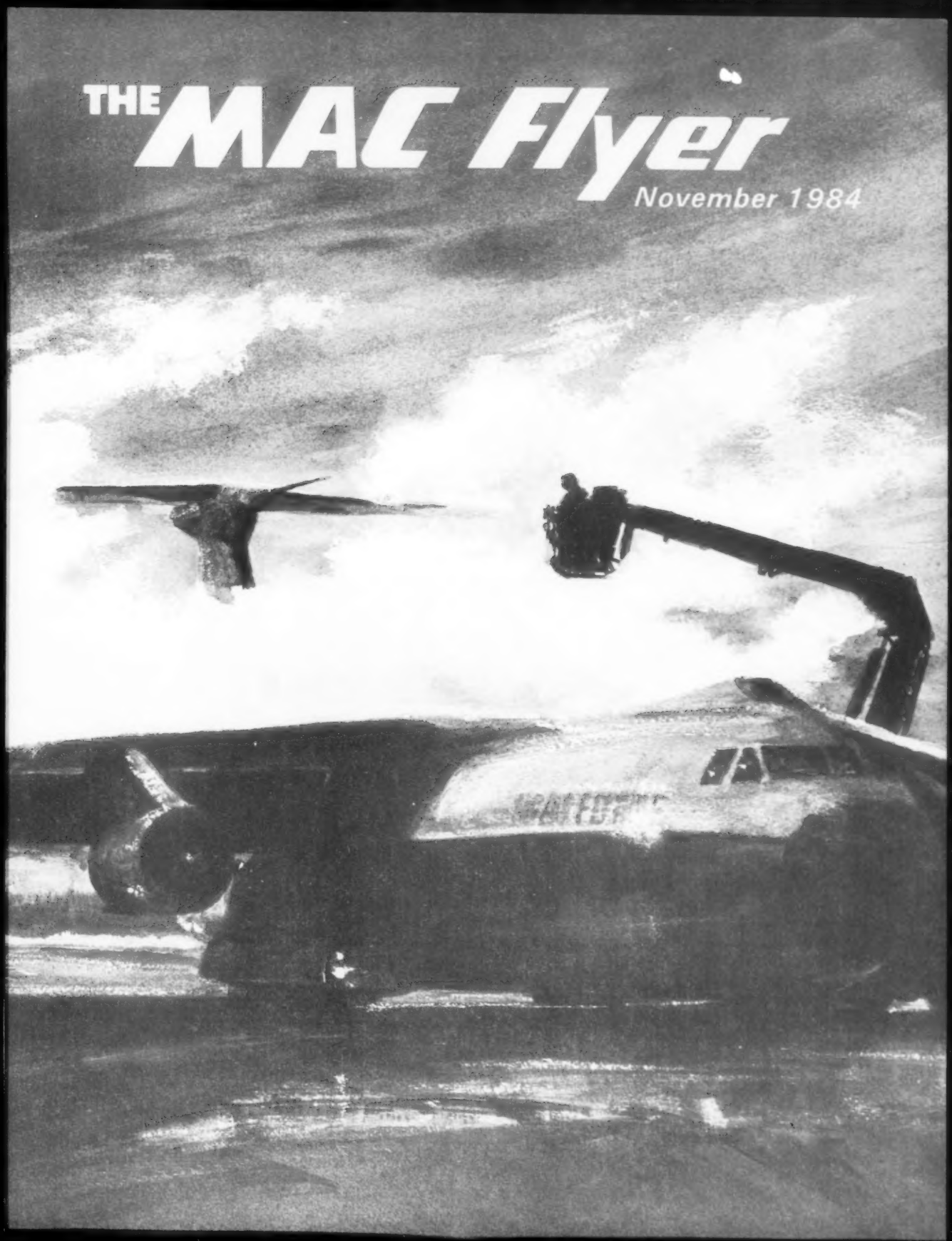
THE MAC Flyer

November 1984



THE MAC Flyer

For Greater Safety in MAC Air Operations

NOVEMBER 1984 | MACRP 127-5 | VOL XXXI NO. 11

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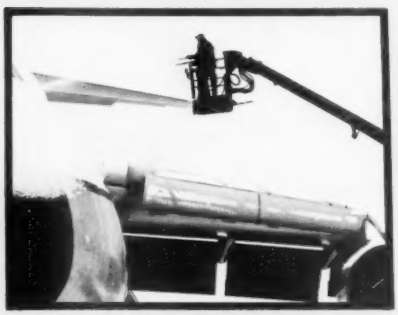

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The MAC Flyer is published by the Director of Safety, Military Airlift Command. The contents are informative and not regulatory or directive. Names of people and places in mishap stories are representative and not necessarily of the aircraft or equipment involved. Information in any article may not be construed as incriminating under Article 31, UCMJ.

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Ah, Procrastination

TMF Wants *Your* Story

This blurb was originally scheduled for publication in our July 84 issue, but due to unscheduled leave, a compressed printing schedule and nonavailability of the proper size paper clips, we had to delay it just a bit. Believe that? Do you also want to know why the crew bus was late?

Now that you fellow skeptics and procrastinators are awake and nodding in agreement, we'll get to the *real* message—the 1985 MAC Flying Safety Writing Contest.

"But that's months away," you'll probably yawn. "Why worry about it now. I've got lots of time to write sumpin'. Leave me alone and let me watch the football game."

Well, your friendly local *MAC Flyer* editorial staff has a great suggestion for those boring halftimes—start working on your prize-winning entry for the writing contest! Get out that trusty, rusty and dusty portable manual word processor, and get your ideas down in black and white. Then edit, polish and edit some more. When you're absolutely, positively sure you have a guaranteed, lead-pipe-cinch winner, edit again and send it off to us. Remember though, your entry *must* contain an aviation safety/mishap prevention message and must conform to the rules published below.

Think about it. If you get your entry off to us early—say in November—you'll be able to relax throughout the holidays. Besides, the sooner you enter, the sooner we can mail you your free C.R. Terror designer T-shirt. The choice is up to you. But wouldn't it be fun to do something early and ahead of schedule? Dare to be different! We await your entries.

The Rules

The 1985 MAC Flying Safety Writing Contest is conducted according to MACR 900-3 and these rules. All entries must be original, unpublished and postmarked no later than 31 March 1985. Stories must be between 1,000 and 3,000 words long (about 6 to 14 double-spaced typed pages); poetry should be about 75 to 100 lines. Entries must contain an *aviation safety/mishap prevention message.* Manuscripts must be double-space typed and submitted in two copies. Identify entries by title only and attach a cover sheet showing the author's name, address, duty phone number and unit. Also, the cover sheet should contain a brief autobiography.

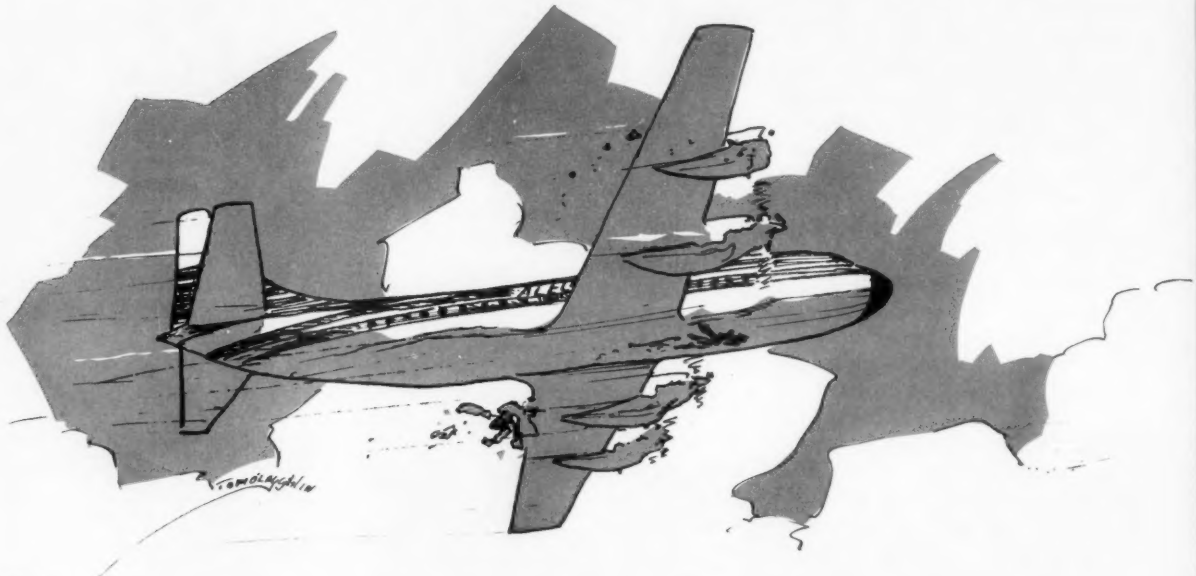
The contest is open to anyone. Entries qualifying under the above rules earn their author a free C.R. Terror T-shirt (so indicate your size) and a free 1-year subscription to *The MAC Flyer.* However, contest prizes (desk sets and plaques) may only be awarded to military members and civilian employees of the Department of the Air Force or Air Reserve Forces. Other entrants may be selected for Honorable Mention in a Special Category. All winning stories will be published in *The MAC Flyer.* Entries should be addressed to:

Safety Writing Contest
HQ MAC/IGFE
Scott AFB, IL 62225

Mishap With A Moral

A Commercial Crew's Tale of Terror, Courage and Triumph

"Reeve 8 Is Mayday!"



When the aircraft finally came to rest, we just sat there for a moment. I hadn't been out of my seat in over seven hours, so I was ready to leave. Captain Gibson gave Gerry and me a big smile and said, "Well, boys, I think we handled that like professionals, so why don't we leave here looking like professionals. Put your coats, hats and ties on, please." I agreed 100 percent.

It had all started earlier that afternoon on a truly rare, beautiful day in south-central Alaska. The Reeve Aleutian Airways Lockheed L-188 Electra was under the command of Capt. James S. Gibson. I was the first officer, and Gerry Laurin was our second officer. In the back, taking care of our 10 passengers, were flight attendants Wendy Kroon and Victoria Fredenhagen. The 1,500-mile flight from Cold Bay to Seattle, almost all over water, was planned to take five hours.

Shortly after takeoff from Cold Bay, we noticed a very slight vibration in the aircraft. The vibration persisted during the climb. Captain Gibson tried various climb speeds and a cycle of the landing gear. Nothing seemed to affect it. Wendy came up front to say she could feel the vibration in the back of the airplane. We were beginning to get a little concerned. Captain Gibson went back to look at the propellers from the forward cargo area windows. While he was gone, I noticed the vibration getting worse. When he returned, Gerry and Wendy went back to take a look. When the captain sat down, I pointed to our control columns. They were starting to shake. This really had our attention. Captain Gibson gave it some thought and finally said, "The heck with it, let's turn a..." *Bang!*

A violent lurch accompanied the loud bang, followed by a rapid decompression. The cockpit immediately fogged up and it became extremely quiet. Only the sound of rushing air disturbed the dream-like silence. I couldn't believe this was happening. I

by First Officer Gary A. Lintner
Reeve Aleutian Airways

grabbed the control wheel and looked out my side window at the number-four engine. The propeller and about half of the reduction gearbox had disappeared.

When I attempted to level the wings, the wheel seemed frozen. I saw that Captain Gibson was on the controls and also having a great deal of difficulty. He engaged the autopilot, and the aircraft responded—not well, but enough for now. We expected the airplane to come apart and start tumbling at any moment.

I yelled to Captain Gibson that we had lost number-four. He pulled the shutdown handle and said, "Okay, Gary, declare an emergency!" I fumbled for my microphone and tried to bring my voice under some semblance of control. Finally, with a tremulous voice, I said the words we all hope we'll never have to utter: "Mayday, Mayday, Mayday, Reeve Flight 8 is Mayday. Does anybody read me?"

I received an immediate reply from Reeve Flight 92, a Nihon YS-11 flown by Capt. Andy Livingston and First Officer Jon Bergstedt. I quickly gave them as much information as I had at that time. Gerry had come back into the cockpit and reported the propeller had cut through the belly. He and Wendy had been knocked down but were unhurt.

Disturbing Signs

Captain Gibson told us to settle down and assess our situation. We knew we had some control cable damage, but we didn't know how much. The big red "Elevator Boost Off" light was lit—a disturbing sign—and the autopilot was barely able to control the aircraft. It was difficult to descend. Gerry informed us that we had lost the "C" electrical bus because of an apparent generator fault with the number-two engine. This still gave us essential electrical service. The hydraulic and fuel systems looked undamaged.

Suddenly, the whole aircraft shuddered as though it was stalling. I checked the airspeed—it was steady at 210 knots. The shuddering soon quit and then started again. It felt like a tail flight control was just flopping in the breeze. We desperately needed a visual inspection of the tail.

I called Flight 92, told them about the shuddering, and began working on an intercept. We began to suspect that the shuddering might be caused by an autopilot "glitch," but we couldn't be sure until Captain Livingston looked us over.

Wendy came back up front and said she had actually seen the propeller come off. It had opened a hole just a few feet from where she had been standing, and she could see the ocean 20,000 feet below. Since she was understandably shaken, we told her to sit in the jump seat and get on oxygen.

Captain Gibson continued working with the autopilot to get some kind of proper response. The main turn-control knob would give about five degrees of left bank when turned full left. When it was turned just slightly to the right, the aircraft would roll rapidly right, but didn't want to stop. To stop it, the knob had to be turned *fully* left. Even with that, the recovery was very sluggish. The pitch trim wheel had little or no effect on the elevator. The rudder wouldn't budge. The trim tabs were frozen in place.

We eventually arrived at 11,500 feet and prepared to level off. Gerry reached up to adjust the power levers. He moved them, but the horsepower gauges remained constant. He moved them again. Nothing. The engines were frozen at cruise power. All we had was either cruise power or "off."

I relayed the latest news to Captain Livingston. I could tell from his voice he knew exactly the situation we faced. With no control over our engines, landing would be

The propeller and about half of the reduction gearbox had disappeared

very difficult. Most pilots have given some thought to landing an airplane with control problems. Most of these thoughts, however, have included using engine power to help with pitch control—something we didn't have.

We finally joined up with Flight 92 about 40 miles northeast of Cold Bay. Seeing that YS-11 slide in next to us gave us a boost. Our spirits rose even further when the crew gave us the good news that tail flight controls all looked good. The damage appeared to be confined to the belly. Although the shuddering would continue on and off for most of the rest of the flight, at least we knew our flight controls were intact. Everything else looked good.

As we approached Cold Bay, we saw that we would have to use the fuel crossfeed system. With the number-four engine not using fuel, the right wing was getting heavy. If the crossfeed didn't work, we would have to land immediately. Gerry started the crossfeed procedure while we anxiously waited. It worked!

After considering the many factors involved in planning to land our damaged aircraft, we decided to proceed on to King Salmon. The airplane was now under fairly good control with the autopilot. We had 210 knots at 10,000 feet. The three remaining engines and all other systems were working normally, and we had plenty of fuel, even at these low altitudes, for many hours of flight.

On to Anchorage

As we headed toward King Salmon, we began to feel better about our situation. The weather was beautiful. Considering what had happened, the airplane was running well. We started to entertain the idea of going on to Anchorage, which would take about two hours. Our Flight 92 had been exchanged for a Coast Guard C-130, so we had lots of professional help close by if we had to go down enroute. After much deliberation, we decided to proceed to Anchorage.

We spent our time enroute in constant conversation among ourselves and with company dispatch, trouble-shooting our damaged systems. The dispatch personnel were pouring over all the technical manuals. Abeam Homer, Alaska, we were joined by an Air Force ARRS HC-130.

...the propeller had cut through the belly...

It was good to see Anchorage again—even from 5,000 feet with no apparent way down. The weather was perfect with calm wind. Now it was time to start experimenting with our controls and systems to see what was available to us. The consequences of wing flap and landing gear extension would be critical. The airplane couldn't stand much pitch change at all.

During the next two hours, Captain Gibson experimented with many combinations of autopilot, flight director, and brute force. We had hoped to get enough control with the autopilot to actually land the airplane. Unfortunately, it didn't look as though it could be done. Captain Gibson had made numerous practice approaches, remaining at 5,000 feet each time. The autopilot just didn't have the fine control we required.

A belly landing on the tidal mud flats around Cook Inlet appeared to be a good possibility. Captain Gibson, who was by this time exhausted, asked me to fly the airplane while he talked to the company on the radio.

Landing Experiments

From the experiments, Captain Gibson had found that overpowering the autopilot with muscle gave a pretty good turn. I tried the same thing. I was amazed to find that I had good aileron control. I tried some elevator and actually got some good pitch response. I checked the autopilot; it was off. I immediately informed Captain Gibson. We both got on the controls and, with the additional muscle, the response got even better. We had five degrees of bank either way, and about one degree of pitch. The rudder remained frozen.

We finally felt confident that we could land the airplane. I think our stranded flight attendant, Wendy, was happiest of all. She decided to return to the rear and help Victoria prepare the cabin for landing. With Gerry's assistance, Wendy made her way bravely across the gash in the floor, and back to the rear.

Now we would see whether the wing flaps and landing gear would work. We didn't look

forward at all to trying this. With a firm grip on our control wheels, Gerry moved the flap handle slowly to the "approach" position. The pitch change was very slight. We then lowered the landing gear. It worked perfectly. Things were looking up.

With the landing gear down and three engines running at cruise power, we soon ran into a control problem. The aircraft wanted to turn to the right. It took all three of us on the controls just to hold the wings level. The only remedy was to raise the gear. We did this, and again, it worked perfectly. Now we knew, with our available horsepower from number-one and number-three engines, we could make a safe go-around. That made for a safe approach.

Suddenly the whole aircraft shuddered as if it were stalling!

Our last major maneuver before the approach was to shut down the number-two engine to slow the aircraft. This would still give us electrical power until number-one and number-three were shut down. Gerry pulled the "E" handle. The engine spun down and the propeller feathered up perfectly. That was a real relief. This meant that the other engines should do the same. If one didn't, it would be a wild ride!

We advised everyone that we would be making an approach with a possible go-around. At 5,000 feet and 25 miles out, we got on the localizer course. The aircraft was handling well with both of us on the controls. When a bank was required, Captain Gibson would call out which direction and how much. I would then follow through.

We intercepted the glideslope and lowered the landing gear. Our airspeed stabilized at 170 knots. Too fast! We crossed the threshold and Gerry called 175 knots. Captain Gibson said, "It's no good, guys. Let's go around. Gear up." Gerry raised the gear handle and we waited anxiously for the lights to go out. When they did, I checked the airspeed and rate of climb—140 knots and 150 feet per minute. We were slowly climbing in good shape.

That was just for practice. Now we knew how to land. We climbed to 1,000 feet and turned on a wide downwind. We didn't want a lot of excess altitude. This approach would be much flatter, using the landing gear more for descent control. We wanted to maintain about a one-degree glideslope and touch down "on the numbers." The only hard part would be judging exactly when to lower the landing gear.

We turned final about 15 miles out and eyeballed the runway. When it looked good, we lowered the gear. Our airspeed settled at a perfect 140 knots. We continued eyeballing the runway.

We crossed the threshold and entered "ground effect." The airspeed jumped up to 146 knots. That was just fine. We figured 160 knots would be the maximum allowable. We touched down and Gerry pulled the "E" handles for engines one and three. They immediately shut down—a big relief. Now it was just a matter of staying on the runway—and stopping.

We stayed on the centerline for quite a while, but slowly started drifting off to the left. Captain Gibson yelled for me to get on the right brake. I gave it all I had, but it didn't seem to have any effect. Our speed hadn't dissipated very much, so we were a long way down the 10,900-foot runway. The left main wheels going into the dirt pulled us hard over to the left. We saw the ditch coming up. Captain Gibson yelled, "Brace yourselves!" Just as the nosewheel started down into the ditch, we came to a rapid stop.

My God, but that felt good!

(Editors' Note— Catastrophic malfunctions can happen to any aircraft, and handling the ensuing emergency successfully depends upon how well the crew is coordinated in its efforts and how well prepared they are both mentally *and* physically. This particular emergency is an illustration of how good crew coordination can terminate a nail-biting IFE into a one-of-a-kind bar story. By the way, FAA and NTSB investigators were unable to determine the exact cause of the failure of the gearbox/engine/prop. But on the positive side, this was one where everybody walked away from the landing, albeit a bit on the shaky side.)

Air Line Pilot

Cold Weather Operations

Are You Ready for Snow, Ice and Freezing Temperatures?

The approach of old man winter brings a new set of hazards that we, as MAC crewmembers must deal with. Not another rehash of snow and ice and slippery runways, you may moan. Well actually, yes. But for good reason. Did you know that highly experienced aircrews tend to become complacent when faced with aircraft icing and subsequent deicing delays? Do you know how much "white stuff" on your aircraft is *too* much? Wait a minute, you say. No one flies with ice on their wings! Well, how often have you heard, "maybe a little ice or snow on the wings is okay," or "don't worry, it'll blow off as we accelerate down the runway?" Throwing the dice is *no* way to operate a multi-million dollar aircraft. So, yes, it's time for a review of icing hazards. First, we'll touch on how ice affects aircraft flight characteristics, and then we'll look at a suggested aircrew checklist for winter operations.

Adverse Flight Characteristics

Fact: Structural ice reduces aerodynamic efficiency. But did you know as little as one-half inch of ice on the leading edge of some airfoils can reduce lift by *50 percent*. Even a thin layer of frost disrupts the smooth flow of air over the airfoil, decreases lift, and increases drag, resulting in increased stall speed.

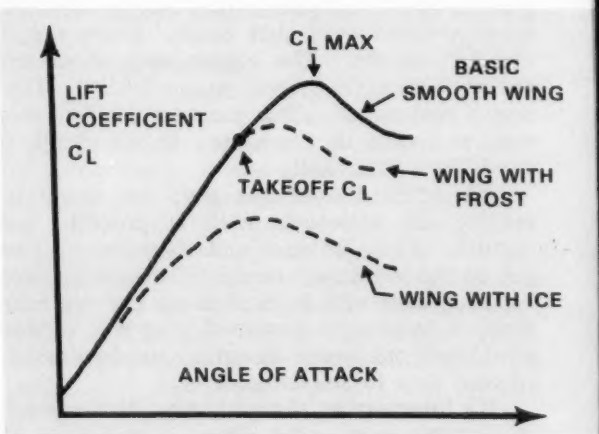


Figure 1. Effect of Ice and Frost

As shown in Figure 1, the coefficient of lift is significantly reduced by ice or frost. Structural ice changes the basic shape of

your wing's carefully designed leading edge, producing severe local pressure gradients which are detrimental to the creation of lift.

The kinetic energy of air in the boundary layer is an important factor in determining the stall characteristics of a wing. Some types of ice, especially frost, will roughen the skin surface and seriously reduce the energy of boundary layer air. This allows the airflow over the wing to separate at a lower angle of attack. The danger is—you don't know *what* lower angle of attack!

When separation occurs at lower angles of attack and at lower lift coefficients, vastly different (poorer) flying characteristics result. In other words, with ice and/or frost on your wings, you're now the pilot of a new and unique airplane with a wing design that has never been tested. And while the shape of your wing is changing, you're also increasing the aircraft's gross weight.

A heavy frost can typically increase stall speed by 5 to 10 percent. Since takeoff speeds are generally 5 to 25 percent above stall, it's possible an airplane with frost or ice will not be able to take off at the desired speed, because that speed is for the airfoil you used to have, not for the new one you're now "testing." Moreover, if you're able to get airborne at a minimum speed, you may be so close to stall that light turbulence, wind gusts, or even a simple turn could produce a complete, deep stall.

In the event you've decided your job description doesn't include being a test pilot (so you perform a good preflight to ensure your wings are clear), you're still not home free. As you taxi for takeoff, it starts to snow or sleet. Sitting in icing conditions while waiting for a clearance or while taxiing is far more dangerous than flying through the same stuff, since ice is accumulating on the total wetted area of the aircraft rather than on just the leading edges. If there's a delay, you'd better check your aircraft's wings and fuselage. How much accumulation of ice is too much? If you can detect *any*, it's probably too much. Remember the ill-fated Air Florida mishap of a few years ago.

Now that we've reviewed the effects of structural icing, let's take a look at how to best prepare you and your aircraft for winter operations.

WINTER CHECKLIST FOR CREWMEMBERS

Personal Preparation

- Are you fit? Don't fly with a cold—go see the doc and don't self-medicate. Remember, even a mild cold increases the risk of disorientation as well as ear and sinus blocks.
- Do you have the right clothing? Dress for the environment, not the flightdeck.
- Do you know your aircraft's crosswind limits, hydroplaning speeds, and icing limits? Do you know how to survive if forced to abandon your aircraft? Do you *really* know how to use your survival equipment?

Sortie Preparation

- Check the weather carefully. Find out the freezing level, the crosswind component, the cloud types and the chances of fog or other restrictions to visibility.
- Check the diversion bases. How much fuel is required? Check the serviceability of the airfields and aids. What emergency enroute alternates do you have?
- If you fly low-level, know your adverse weather procedures.
- Allow more time than usual for preflight and taxi.

Pre-Flight Preparation

- Do all the walk-around checks thoroughly and carefully, despite the weather. Check carefully for ice on control surfaces.
- Check aircraft position. Is it on ice? Can you turn? Where are the snow banks?
- Is the windscreen clear? Do the heating and anti-icing systems work? Have you just covered the floor with snow from your boots?
- Follow the warm-up times necessary for your aircraft. Oil, hydraulics, flight instruments and your own body all take longer to function properly in the cold. Make sure they're *all* warmed up prior to flight.

Taxiing

- Think ahead. Remember painted areas can be very slippery. Allow more space for stopping and turning. Increase the interval between aircraft.

• Use power carefully, don't blast snow over other aircraft, ground crew or equipment.
• If you can't see properly, *STOP*.

Takeoff and climb
• Carefully review the takeoff and landing data. Water, ice and snow seriously affect takeoff and stopping distances. If your takeoff is vertical, remember the dangers of white-out in loose snow.
• Check pitot heating systems. When will you need anti-icing?
• If directed by your aircraft flight manual, recycle the gear after safely airborne.

In-Flight
• Don't linger in icing conditions. If you encounter unforecast weather, let METRO know.
• Keep continual track of destination and alternate weather conditions. Have the fuel requirements changed due to excessive icing?
• Don't *push* the VFR rules. Know what radar services are available enroute and, if in doubt about the weather, use them.
• Snow can complicate VFR navigation considerably. If in doubt about your position, get help.

Approach
• Know the freezing level and plan to pass through it as quickly as possible.
• Evaluate landing conditions carefully prior to the approach. What's the crosswind component, braking action, cloud base and visibility? If a safe approach isn't possible, divert.
• Don't accept a sloppy approach, if you make one, *go around*. Make a positive decision at the decision height. Beware of visual illusions caused by blowing snow, rain and mist.

Landing
• If the runway is slippery, land positively, without drift, on centerline, or IAW your Dash-One.
• Know your options in the event of a directional control problem before it happens to you.
• Don't try to turn off the runway too early. Taxi carefully and slowly, remembering the aircraft, now much lighter, will have less braking action then when taxiing out.
• Approach the marshaller cautiously. If you can't stop, what will you hit? Don't relax until the aircraft is chocked and shut down. Even then, watch the ladder, it may be slippery too.

WINTER CHECKLIST FOR ENGINEERS
Personal Preparation
• Do you have the right clothing? Keep your boots and clothes clean and dry; brush ice and snow off before entering the aircraft. Remember that several layers of light clothing give more protection than one thick layer.
• Even simple jobs take longer in cold weather. Plan ahead and don't rush a job at the expense of getting it right.

Personal Safety
• Take care when walking on wings and climbing ladders. Use restraint devices, if available.
• If marshalling, remember the aircraft may slide. Where are you going to stand? Can you be seen clearly?
• Have you checked the fire extinguishers near your aircraft lately? They may be frozen solid.
• Very cold metal can "burn" your skin, so wear gloves.
• Beware of snow or flying ice in the jet/propblast of taxiing aircraft.

Aircraft Safety
• Hats and gloves are a good source of FOD—check that they are secured.
• Don't use deicing fluids near hot surfaces or engine exhausts.
• *Never* break or chip ice off aircraft surfaces—use deicing fluids.

Aircraft Inspections
• During the walk around, pay particular attention to wheel wells, intakes, tires, control surfaces, hinges, pitot tubes, hydraulic actuators, and static ports.
• Ensure the windscreen is clean and clear of scratches.

Cold weather brings new variables which impact every aspect of aircraft operation. Now is the time to consider how ice, cold temperatures, low ceilings and poor visibility will affect safe, effective mission accomplishment. Don't bet it *all* on a roll of the dice.

Flying-Hour Milestones

CMSgt Robert E. Agee, 180 TAS
MSgt Thomas Evans, 57 MAS
MSgt Lynne Fish, 4 MAS
MSgt Thomas L. Gustafson, 4 MAS
MSgt Richard Howard, 701 MAS

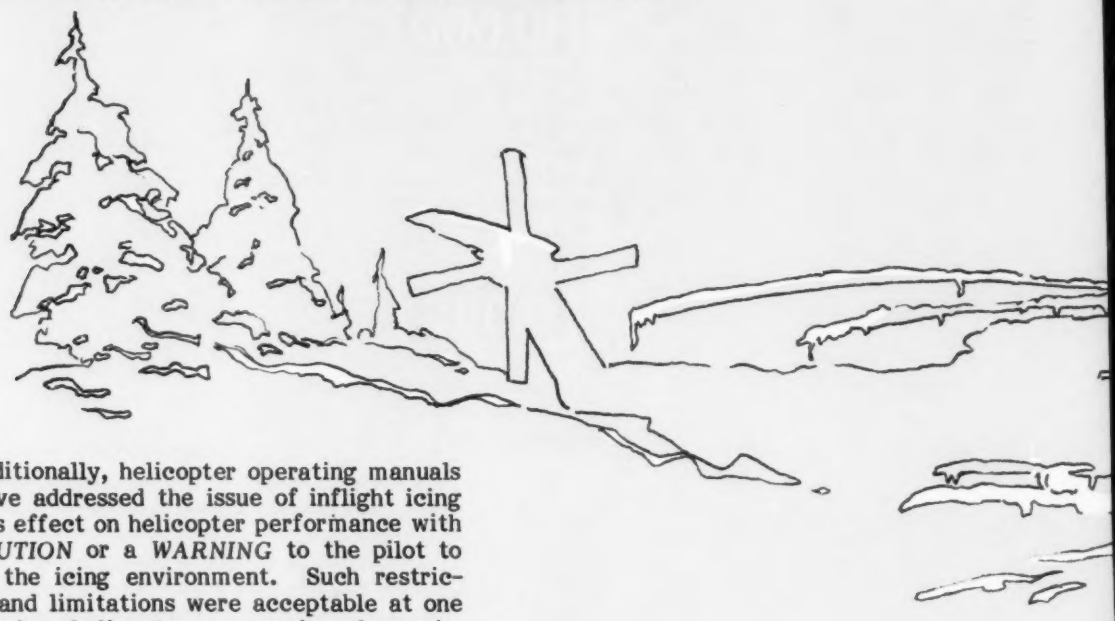
Lt Col David A. Beasley, 135 TAG
Lt Col Joseph L. Castonguay, 4 MAS
Lt Col Robert W. Walker, 180 TAS
Maj Michael L. Haines, 4 MAS
Maj Michael J. Kravitz, 4 MAS
Capt Bruce M. Adkins, 701 MAS
CMSgt Jacobo Jaquez, 4 MAS
SMSgt Ronald L. Dowden, 180 TAS
SMSgt James F. Knapp, 1 MAS
SMSgt Jay H. Long, 1 MAS
SMSgt Claude T. Newbold, 4 MAS
SMSgt Louis A. Prawitz, 180 TAS
MSgt Gerald L. Bommer, 328 TAS
MSgt James M. Brewer, 4 MAS
MSgt Jack L. Coggins, 57 MAS
TSgt Larry D. Lenderman, 57 MAS
TSgt Lew W. Perry, 57 MAS
SSgt Armando Castillo, Jr., 773 TAS
SSgt James P. McRaven, II., 57 MAS

Capt Gary L. Copsey, 4 MAS
Capt Billy J. Harrington, Jr., 1550 CCTW
Capt Edward G. Wilson, 1551 FTS

Ranks and units are those at time of award. See MACR 900-3 for details on how to apply for your own milestone award.

Helicopter Icing

Inflight Icing Causes Unique Hazards for Helicopters



Traditionally, helicopter operating manuals have addressed the issue of inflight icing and its effect on helicopter performance with a *CAUTION* or a *WARNING* to the pilot to avoid the icing environment. Such restrictions and limitations were acceptable at one time when helicopters were viewed as aircraft operating primarily in VMC. Since early helicopters lacked the equipment and sophisticated systems normally employed for flight in IMC, there was little justification for expending valuable time and resources on helicopter icing research and development.

Modern helicopters have a greatly expanded concept of operations and today routinely perform a broad range of tasks in IMC and marginal VMC. It's this expansion of the helicopter's operating envelope that compels a more thorough understanding of the hazards associated with inflight icing.

Hazards of Inflight Icing

The risks associated with flight in subzero precipitation or moisture have been known since the pioneering days of fixed-wing flight. Typically, we have characterized icing problems by their effect on lift, drag, weight and thrust. It is readily accepted that inflight icing reduces thrust and lift, and increases drag and weight, all to the detriment of an airplane's performance.

Rotary wing aircraft also suffer from these effects when exposed to icing conditions and, in addition, are susceptible to various complications that are *not common* to fixed-wing aircraft. Although many questions remain regarding helicopter icing and its impact on aircraft performance and mission effectiveness, researchers are beginning to uncover significant insights into this facet of helicopter development.

The rotor blade icing process and its subsequent effect on helicopter performance can't be analyzed in the straight-forward manner used to explain ice accretion on the leading edges of a fixed-wing aircraft. Spanwise elements of a rotor blade, unlike the leading edges of an airplane's wing, move

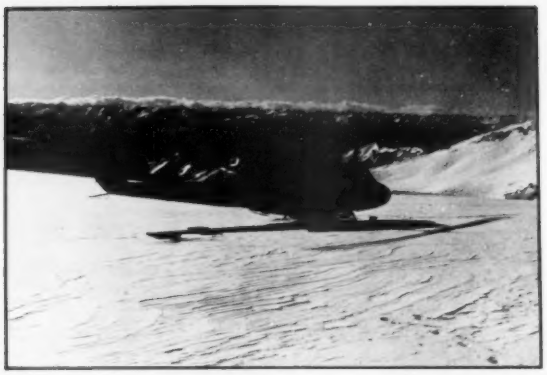
through air at various airspeeds. Rotor blade icing is made even more complex by the constantly changing angle of attack experienced by the helicopter's main rotor blades in normal forward flight. These obvious and unique characteristics of the helicopter's lifting system, combined with differing surface temperatures along the blades' spanwise sections and smaller airfoil thicknesses, make helicopter rotor blade icing complex and extremely hazardous.

A major hazard is the deterioration of normal autorotational qualities. The adverse effect of main rotor icing on autorotational performance was documented during artificial and natural icing tests conducted by the US Army in the mid-1970s. A major finding was that moderate ice accumulation (approximately one-half inch) on inboard portions of the UH-1H Huey rotor blade (and those on similar type aircraft) was sufficient to seriously deteriorate autorotational qualities by causing a loss of 22 rpm during autorotation at 70 knots indicated airspeed.

Deterioration of normal autorotational rpm results from ice accumulation in greater amounts near the inner portions of the rotor disc which directly affects the blades' efficiency with respect to upward airflows during autorotation.

The reported result is that with about one-half inch of ice on the main rotor blade's inner portion, *minimum (safe) rotor rpm can't be maintained during autorotation.*

Helicopter pilots shouldn't attempt to judge or estimate main rotor blade ice accumulation by observed buildup on the windshield or other parts of the aircraft because icing occurs at an accelerated rate on the rotor blade as compared to accumulation on the fuselage. A more reliable method for monitoring the buildup of rotor blade ice on UH-1 type aircraft is to compare power requirements after the formation of inflight ice to power settings prior to ice detection. Researchers indicate that blade icing of one-half inch or greater on the UH-1 will be accompanied by a five to six pounds per square inch (psi) torque increase over the "before" or "no ice" power requirement. Icing tests conducted in the United Kingdom document cases where significant autorotational rpm deterioration occurred with only six percent power increase over the "no ice" power requirement.



Helicopter pilots should remember that even small buildups of ice on the main rotor blades can significantly deteriorate the available autorotational rpm to a level where safe landings cannot be assured. When inflight icing occurs, most of the damage to autorotational performance is done by the initial ice accumulation, i.e., the first one-fourth inch of ice on the rotor blade. For helicopter pilots, this means that every encounter with icing should trigger an expanded crosscheck with careful attention to power settings. If continuous increases in power are required to maintain altitude and airspeed, there is reason to suspect that autorotational rpm has been compromised and the icing environment should be left quickly. If the accumulation of rotor blade icing deteriorates autorotational rpm, then it would seem that the shedding of rotor blade ice would be welcomed. Inflight shedding of rotor ice can and does occur. Unfortunately, it is as likely to create a problem as it is to relieve one.

Symmetrical (affecting all rotor blades simultaneously in the same way) shedding of ice in flight can be beneficial by restoring the rotor blades to a more efficient or clean configuration and by reducing the weight of the aircraft. Asymmetrical shedding (affecting less than all of the main rotor blades), however, can create extremely severe vibrations depending on the amount of ice discharged, the type of rotor system and other factors. The severity of these vibrations is documented by test pilots engaged in conducting natural icing studies with helicopters. Their reports identify numerous occasions where inflight icing tests have been aborted because of main rotor blade icing and subsequent asymmetrical shedding which caused vibrations so severe that it became all but impossible to read the instrument panel.

The severity of vibrations resulting from asymmetrical shedding of rotor ice is generally thought to be a function of the unbalanced weight of the rotor system and therefore may be expected to be greater for two-bladed and three-bladed systems than those rotor systems employing four, five or more blades.

Ice shedding from the main or tail rotor can also produce problems apart from an unbalanced rotor system. Though documentation is less than authoritative, researchers have experienced and expressed a concern for structural or foreign object damage to the helicopter's fuselage, rotors or engines resulting from rotor blade shedding. This particular hazard appears to be more threatening to large multi-engine aircraft (more than 12,500 pounds) and especially for tandem rotor systems.

Asymmetrical shedding of rotor blade ice can be minimized by avoiding static temperatures lower than -5° Celsius. Research tests with UH-1 type aircraft suggest that by rapidly varying main rotor speed or entering autorotation, symmetrical shedding may be induced when static temperatures are -5° Celsius or warmer. *Collective and cyclic inputs were generally ineffective in producing symmetrical shedding and may result in asymmetrical shedding. At temperatures below -5° C, it's generally not possible for a pilot to induce shedding.*

The disastrous effects of inflight icing on helicopter engines has been reported in many military and industry publications. Inflight icing presents a hazard to normal engine performance in two major ways, *ice ingestion* and *air starvation.* Ice ingestion is minimized on many helicopters by the availability of engine anti-icing systems used to prevent the accumulation of ice deposits in the area immediately forward of the compressor section. When operating normally and environmental conditions don't overtax their capabilities, these systems considerably reduce damage from ice ingestion.

Even when aircraft are equipped with engine anti-icing systems, there remains a need for caution to ensure normal operation of the engine. Engine anti-icing systems will prevent the buildup of "ingestible ice deposits" only when outside meteorological conditions or aircraft operating conditions (most

notably forward airspeed) do not exceed systems' design capabilities. As an example, when operating normally, the engine air inlet anti-icing system on the HH-3 helicopter will maintain the engine inlet surfaces at or above 37.8° C (100° Fahrenheit). However, if outside air temperatures are very cold, extremely heavy icing conditions prevail, or the helicopter is maintaining a high forward airspeed, the engine air inlet anti-icing system will be incapable of maintaining a high enough temperature to prevent the buildup of ice in the engine inlet duct and the potential for subsequent ingestion of ice deposits exists. Many HH-3 pilots have experienced an occasion where cruise speeds in excess of 100 knots couldn't be maintained without illuminating the engine inlet anti-ice caution lights—an indication that inlet air surfaces are not being maintained above 37.8° C and that the potential for ice ingestion has increased significantly. A common remedy for such conditions is to reduce airspeed to about 70 KIAS which provides the anti-ice system a chance to recover from the high airspeed and/or harsh outside conditions.

A major hazard is the deterioration of normal autorotational qualities

Even when the engine air inlet anti-icing system is capable of sufficiently heating the engine inlet surfaces, there is still the threat of random ice ingestion if deposits on rotors, fuselage sections, antennas or windshield surfaces shed and are directed into the engine air intake stream. Shedding ice deposits from the helicopter, often larger than household ice cubes, can be devastating to engine compressor blades if ingested into the engines.

Perhaps the most insidious aspect of engine anti-icing is the case where engine anti-icing systems have been activated and fail to perform as expected. When a failure or malfunction in the anti-icing system does occur and there is *no* accompanying cockpit annunciator light or instrument to alert the pilot of a failure in the anti-icing system, it may create a false sense of security and no warning that an engine failure may be imminent.

Air starvation of the engine due to accumulation of ice on the engine inlet screens has been reported by the Navy and other operators. Several helicopters had engine flameouts due to ice accretion on the engine inlet screens, and in one case, air starvation of both engines occured only a few minutes after ice was first noticed forming on the aircraft. Flight in icing conditions with inlet screens installed is extremely dangerous and must be avoided if at all possible.

Icing forecasts prepared by the National Weather Service or the USAF Air Weather Service may be of little use to helicopter pilots if those pilots are uninformed about how the various forecast icing rates were first determined. The methodology and terminology used to characterize and classify the icing environment was developed from inflight icing tests conducted on DC-4 and DC-6 type aircraft. Thus, such labels as trace icing, light icing, moderate icing, and heavy icing, which are used to relate the rate of ice accretion on a fixed cylindrical probe on a DC-6, are of little use to the helicopter pilot in ascertaining or predicting the rate of ice accretion on a complex rotor system. As an example, light icing is defined as an accumulation of one-half inch of ice on a small probe per 40 miles. The rate of accretion is sufficient to create a hazard if flight is prolonged in these conditions, but insufficient to require diversionary action. While the prior definition may well be appropriate for a 100,000 pound airplane, there is no assurance that the rotating surfaces of a helicopter will accumulate only one-half inch of ice over that same 40 miles. Further, while one-half inch of ice on the wing of a large airplane might appropriately be called "light icing," there is every reason to believe that one-half inch of ice on the leading edge of most helicopter rotor systems could result in tragic consequences if autorotation became necessary.

(Editors' Note—MAC helicopter crews should comply with guidance contained in their appropriate 55-series regulations and the All Weather Operating Procedures found in their aircraft's Dash-One.)

Flying Safety

The Great Merlino

A Problem Passenger Becomes an Unlikely Hero

The Great Merlino was fractured again. Well, perhaps not exactly three sheets to the wind, but certainly he had drink taken. He sailed up to the reservation desk in the manner of a galleon under full sail—albeit on a choppy sea.

Here we go again, thought the Great Merlino's wife, dismally. It happens every time we go to a new engagement. She was a small woman, trotting her usual two paces to the rear; wispy, pale, and obviously given to worry. The only possibly redeeming thing, she consoled herself, is that the flight would be only three hours.

The reservations clerk furrowed his brow and ran a finger down the list. "Merlino? No such name here, sir. May I have your tickets, please?"

The florid-faced, loud-suited apparition before him fairly boomed his wounded incredulity. "Tickets, sir? Tickets? I, sir, am the Great Merlino, illusionist supreme. Principal prestidigitator to princes and potentates. Perhaps I can exemplify my expertise."

He was pushed aside, gently but firmly, by the small woman. "The name is Jenkins, young man, and we'll have non-smoking, if you please."

"Certainly, madam." The clerk made haste to pass the disturbing duo on to the next long-suffering link in the chain of airline personnel. "Please take a seat in the departure lounge." With that, he handed Mrs. Jenkins the two endorsed tickets.

Well away from the confrontation, the Great Merlino felt it safe to continue voicing his dissatisfaction. "Damned counter-jumper. Doesn't know the meaning of civility—shouldn't have kow-tow'd to him, Gladys."

"Oh, sit down! We'll be on the plane directly." With bad grace, Merlino plopped himself upon a skimpy plastic seat and regarded with a malicious eye the other passengers, who watched with trepidation. His wife opened her large handbag, took out a skein of yarn, and immersed herself in knitting what appeared to be an immense, dun-colored scarfish article.

The reservation clerk observed them cautiously, then picked up the telephone connected directly to "Papa Foxtrot Mike," the big jet that stood outside. In the galley, the chief flight attendant anxiously counted her juniors as they filed aboard.

"Is that you Fran?" the reservation clerk asked the chief flight attendant over the interphone connecting desk to plane. "Well, there's a couple of weirdos on this trip." He rapidly shouted down the wail of protest. "No, no! Not dangerous, but you'd better watch your rear! He's some broken-down old conjurer. Make sure you serve thin drinks."

The hostess slammed down the phone. "Well, get on with it, get on with it!" she screamed to her sullen platoon, then trudged toward the cockpit to impart the glad news to the pilots.

Captain Morgan moved irritably as Fran told him of the high potential for trouble. "I don't give two hoots about the great unwashed, Fran. They're your business." She departed as the captain leaned across to shake the copilot awake.

The copilot blinked blearily, and then reached with lightning-like speed for the long, thin lever. "Gear up!"

"Not yet, you fool!" His hand was knocked away by the captain. "Can't you remember? You idiot! You've only got one thing to do. I'll say it once more. *After* we're airborne! *After!*" The copilot nodded. But then, he was always nodding. A first officer's primary task is to agree with his captain, and too frequent indications of assent are most soporific.

Meanwhile, back in the galley, the seat reservation clerk made the fateful announcement over the interphone. "Gird thy loins," he proclaimed cheerfully to the attendants. "Here come the poor ignorant fools who have chosen to fly with you."

"Aw, shuddup!" Fran snarled into her telephone. She turned to her second-in-command. "Really, I don't know why they

by Mr. Roger Marchant
Narrabundah, ACT, Australia

keep that jerk. He's got no class, no class at all."

Even as departure time neared, the Great Merlino refused to join the usual throng that rushed anxiously to the boarding gate. "Let them go, my dear. *We* shall make an *entrance.*" So Gladys fidgeted nervously as the departure lounge emptied. At last, Merlino deigned to stride majestically toward the ground-hostess, just as she was about to close the door.

Meanwhile, on board the aircraft, Fran began to nurture a faint hope that her enemy on the desk had made yet another mistake. She had scrutinized every boarding passenger, and they all looked harmless. She hovered in the galley entrance, impatiently tapping a fingernail as the stewardess on the steps cried, "Last two coming up!"

Then, the Great Merlino's fruity bellow dashed her fool's paradise. "Greetings, my dear. Permission to come aboard? What? No bosun's whistle? We'll have seats on the aisle, quite near the bar, if you'd be so good...."

Fran bit the bullet. The responsibilities of rank were never-ending. "Close the door!" she hissed at her floundering subordinate. Then, bestowing an icy smile upon the importuning thespian, she continued. "Straight up the aisle, sir. See the next hostess." And over the Jenkins' departing backs she gave "cabin staff signal number two" to the waiting girl. It was a code they had all learned on day three of their training course. Loosely translated (and it was only loosely translatable) it meant "trouble-makers—sit 'em down, strap 'em in, and shut 'em up!"

Moments later, Gladys gratefully tucked herself into the window seat, pulled the lap-strap tight, and was back into her knitting. The Great Merlino, however, was not so easily satisfied. He bestowed what he fondly believed to be a roguish smile upon the hostess and informed her, and the adjacent passengers, of his needs.

"A libation, mademoiselle, s'il vous plait. For we who are to venture close to the gods, a godly refreshment! A scotch and ice, if you will. Nay, make it a double!"

The hostess gazed at a spot three inches above his head and recited in a monotone. "Bar doesn't open till we're cruising. Light snacks and drinks will then be available. I thank you." She then departed to the curtained refuge of the galley. "Sweet whistling Beelzebub!" she moaned, leaning against the bulkhead. "Why do I get all the kinks?"

She received scant sympathy from her peers, "That's the way the mop flops, Marge."

In the cockpit the copilot was talking to control tower. "Tower, this is Papa Foxtrot Mike. Request taxi clearance for um...er... ah...," and he looked desperately at his captain who rolled his eyes and shrugged his shoulders in a non-committal gesture that would have made Pontius, the original Pilate, proud.

"Papa Foxtrot Mike, tower," came the rescuing call, "taxi for Baytown, runway two-seven. You're cleared for take-off when ready."

Soon, they were accelerating along the strip, with the captain, white-knuckled on the control column, shouting, "Remember!! After takeoff, *after* takeoff!"

It was hard running up the aisle against a fifteen degree angle of climb, but Fran, valiant at all times, made it. "Sir, put that cigar *out!*"

The Great Merlino regarded her with monumental calm. "Pray why, dear lady?"

Fran took a deep breath. "First, sir, no cigars on aircraft. Second, the 'No Smoking' light is on. Third, you're sitting in the no smoking section."

"I didn't ask for non-smoking, madam."

A man from across the aisle leaned over. "Put it out, buster, or I'll stuff it down your throat!"

"A totally ignorant attitude, sir. You are obviously unaware of my identity. I am...."

"Oh, put the damn thing out!" Fran lost

her cool and snatched the offending object from the Great Merlino's lips.

"An assault, by the great lord Harry! Madam, I shall bring suit! Your company shall pay! I demand that the captain be brought to me immediately!"

By now the fracas was obvious to all. The nearest passengers, having seen TGM take his seat, were expecting trouble. Those farther away craned around or stood up to identify the combatants.

"It's the drunkard. Disgusting!"

"Silly old bugger shouldn't have been allowed aboard!" Fran rushed back to the galley phone.

In the cockpit, Captain Morgan carefully leveled Papa Foxtrot Mike at their assigned cruising attitude. The copilot, in a transport of fear, was holding his hands to his eyes, quietly sobbing. Insistently, the phone rang, forcing the captain to look questioningly over his shoulder. With a peremptory flick, the wild-eyed man with the revolver indicated that he should answer.

"But I listen to every word, okay? You mention me and BOOM! You're no more, okay?"

Captain Morgan nodded cautiously and picked up the phone. "Yes, Fran. Yes, yes. Well, look after it yourself, I can't help."

"Now, captain," the stranger with the large gun said, "straight across the ocean, if you don't mind!"

"But what about my fuel bonus?" asked the captain, a tear in his eye. It was a wail from the depths of the soul.

"Turn, I say, or I'll shoot your copilot..."

"Ha!" screamed the captain, "I'll take that chance. Shoot him and be damned!"

"...then I shoot you!"

"Okay, okay. Turning now."

Then, with a resounding crash, the cabin door opened to reveal an apoplectic Merlino towing a deflated Fran. The whole spectacle was clearly visible to a hundred horrified pairs of eyes.

"So, you cheat, eh?" cried the hijacker, "and you call your security guards. Okay, he goes first!" Leveling his gun, he fired point-blank at the Great Merlino!

What happened then became both a dining-out pass for many passengers and the despair of the media, for there were at least ten different versions of the next few seconds' occurrences. Anyway, the Great Merlino swayed slightly, then, in an excess of pure rage, lashed out a foot. Two pounds of heavy English-leather brogue caught the bandit squarely in the crotch. He immediately lost interest, consciousness and a lot of promise.

The Great Merlino staggered gently and leaned gasping against Fran, who promptly threw her arms about him.

"My hero! But I thought he'd killed you!"

The cabin doorway was now crowded with eager spectators hoping for blood.

Slowly, dramatically, the Great Merlino drew himself to his full height. When he judged he had maximum attention, he put his hand to his mouth, then withdrew it, fist closed. Holding out his arm to the captain, hostess, passengers and all, he gradually opened his hand. There, resting on his palm and still warm, was a .45 bullet. He bowed. "At your service, ladies and gentlemen, the Great Merlino!"

The cheering was spontaneous and frenzied, with the copilot being heard above all. Captain Morgan, with a flourish, then turned Papa Foxtrot Mike back onto the correct course. After all, fuel bonuses wait for no man. Then, with a grand wave of the hand, he addressed the hostess in a voice ringing loud, for all to hear. "Fran, champagne for the Great Merlino!"

And the message attached to this little melodrama? Well, as any heavy-driver will tell you, quite a lot of trust is put by the flight crew in the preflight administration. El Capitano may look god-like, sitting way up in the cockpit, but if a passenger significantly affected by alcohol is allowed aboard, there's gonna be trouble. Point two is to keep the door between the flight-deck and the pax **L-O-C-K-E-D** and operated only as per the rules. Yes, it really can buy invaluable time in a hostile situation. Finally, and most important, no flying operation, particularly where passengers are involved, should be allowed to take place in an atmosphere of boredom, mutual disrespect, or worse, irresponsibility. The story was a bit overdrawn to make the point, but, alas, on occasion it's happened; it really can occur. Let's not be guilty of permitting such lapses to develop.

TMF Instrument Quiz

We at *TMF* thought you might like a little more meat in this month's instrument quiz. So we went across the street and asked the HQ MAC stan-eval experts to give us something for you to chew on. Bon appetit!

1. The ILS localizer transmitter puts out a repeated four letter Morse code group. The first letter of the identifier is always _____.
   a. L (Denotes the facility as an LOC)
   b. I (Denotes the facility as an ILS)
   c. T (Denotes the facility as a terminal VOR)

2. When cleared for a visual approach, what does ATC expect you to do?
   a. Execute a straight-in unless otherwise requested.
   b. Cancel your IFR clearance.
   c. Fly an overhead pattern.
   d. None of the above.

3. What is the purpose of Charted Visual Flight Procedures?
   a. To establish an approach procedure at airfields where no published instrument approaches are available.
   b. To establish arrival procedures at airfields without terminal radar service.
   c. To establish arrival routes and altitudes using prominent landmarks at airfields that have weather reporting and terminal radar service.

4. You are flying an approach to an airfield that has parallel 09/27 runways. As you are intercepting the localizer, the controller states, "Cleared for ILS runway 09 left approach, side-step to runway 09 right." What are your expected actions?
   a. Commence the side-step maneuver as soon as possible after the runway or runway environment is in sight.
   b. Commence the side-step maneuver as soon as the localizer to 09R is tuned and identified.
   c. Commence the side-step maneuver only after reaching localizer minimums.

5. Which of the following reports should be made to ATC or FSS facilities without specific request?
   a. When vacating any previously assigned altitude or flight level for a newly assigned altitude or flight level.
   b. Any loss, in controlled airspace, of VOR, TACAN, ADF, low frequency navigation receiver capability or complete or partial loss of ILS receiver capability.
   c. Impairment of air/ground communication capability.
   d. All of the above.

6. You are planning a PAR approach into a military airfield. If there are no backup approaches compatible with the weather or with your aircraft, your responsibilities upon initial controller contact are?
   a. Request clearance direct to your alternate.
   b. Advise the controller of your new minimums.
   c. Advise the controller of your intentions in the event of lost communications.

7. What is High Intensity Runway Lighting (HIRL)?
   a. Strobe lights located at the approach end of a particular runway.
   b. Elevated bidirectional lights which extend the length of the runway.
   c. Runway centerline and touchdown zone lighting system designed to facilitate landing, rollouts and takeoffs.

8. You just touched down after flying a PAR approach with weather at minimums. Your flare was high and touchdown long, and you notice the centerline lighting is displaying alternating red and white light. What does this indicate to you?
   a. Less than 3,000 feet, but more than 1,000 feet of runway remaining.
   b. No significant meaning as all centerline lights are alternating red and white.
   c. Less than 1,000 feet of runway remaining.

9. Air Force pilots flying civil SIDs must plan to cross the departure end of the runway at least _____ feet above ground level.
   a. 40
   b. 60
   c. 35
   d. 200

10. When flying in Positive Control Areas, all VFR activities are prohibited.
   a. True.
   b. False.
   c. True, except climbs, descents, and VFR-on-top operations on IFR Flight Plans.

11. If a climb rate or gradient is not published on a SID, an aircraft is expected to climb at a rate of at least _____ feet per nautical mile. If a steeper gradient is required, it will be published on the SID.
   a. 50
   b. 150
   c. 200
   d. 230

12. When executing a departure procedure or SID, aircrews must climb on runway heading until reaching at least _____ feet above the aerodrome elevation, unless otherwise instructed.
   a. 300
   b. 400
   c. 500
   d. 1,000

13. With regard to flying a holding pattern (in lieu of procedure turn) approach, if cleared for the approach while holding in the holding pattern (in lieu of procedure turn), and the aircraft is at an altitude from which the approach can be safely executed, additional circuits of the holding pattern are not expected by ATC. If additional circuits are desired, they must be requested by the pilot.
   a. True.
   b. False.

14. IAW AFR 60-16, on direct flights, or where a MEA or MOCA is not published, aircraft will be flown at least 1,000 feet (2,000 feet in mountainous terrain) above the highest obstacle within a horizontal distance of _____ nm of the intended route.
   a. 3
   b. 8
   c. 5
   d. 22

The Answers

1. b. Ref. AFM 51-37, para 2-12b (4)
2. a. Ref. AFM 51-37, para 6-26h
3. c. Ref. Airman's Information Manual (AIM), para 384.
4. a. Ref. Airman's Information Manual, (AIM), para 380.
5. d. Ref. Airman's Information Manual (AIM), para 342.
6. c. Ref. AFM 51-37, para 6-17b (3).
7. b. Ref. AFM 51-37, para 6-21a (1).
8. a. Ref. AFM 51-37, para 6-21b (2).
9. c. Ref. AFM 51-37, para 3-2a.
10. a. Ref. FLIP General Planning, para 3-3b.
11. c. Ref. AFM 51-37, para 3-2b (3).
12. b. Ref. AFM 51-37, para 3-2d.
13. a. Ref. AFM 51-37, para 6-12e.
14. c. Ref. AFR 60-16, para 8-9.

"Sir, We Have An Emergency!"

Marginal Communications Compound an Inflight Medical Emergency

by Maj. Peter P. Zapalo, Jr.
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When we plan a mission, we usually divide it into parts: departure, enroute, and arrival. And although we should always give equal attention to each part, we don't. Thinking ahead to our destination, we study the weather and the approach. The enroute portion is usually considered a straight line between two points (more or less) which misses the restricted areas, and occupies the period between bag drags. We then look at our departure, wrap the whole thing up, and take it on the road. It's just another day at the office.

It wasn't any different that particular day, at least until block out. As the aircraft moved forward, lights and flags popped into view. Now what? I asked myself. Just then the engineer chimed in, "Sir, a generator has dropped off. Just a minute and I'll try to get it back."

That's all I need, I thought. In my Walter Mitty style of thinking, we'd been playing escape and evasion through some real garden spots for the past few days: in and out of Beirut, Damascus, etc. I was constantly checking my six for that curl of smoke with the telephone pole attached to the end of it, or waiting for my friendly neighborhood terrorist to shove a "Saturday-night special" up my nose and cure my deviated septum once and for all. Added to this, my trusty twenty-year old steed was now going to act up.

"It's okay sir, we've got it back."

The words brought me back to the real world and put me more at ease. Having two of the squadron's best engineers on board took a big load off my mind and left me time to think about more serious problems such as where did I put my Pepto Bismol?

Departure was as uneventful as communi-

Honorable Mention Winner, 1984 MAC Flying Safety Writing Contest

cations will allow in the Middle East. One of the great mysteries of the world is, and always will be, how certain nations can hold the rest of the world hostage with their vast energy resources and still survive with a communications system based on two "Campbell's Chunky Chicken Noodle Soup" cans and a string.

The flight from Damascus to Islamabad is long, the terrain changes dramatically, and on this occasion so did the weather. We had left sunny, clear skies and flown into an area reminiscent of Pacific monsoons.

We were approximately 100 miles from our destination when the huge weather system began to block our path. I urged the navigator to search his scope for the soft spots as we began our way through. "No major cells," he said. "Just some real heavy rain, but it's going to get bumpy. Let's get permission to take it 30 degrees to the right." A simple enough request one would think. But consider the situation. We weren't under radar control. The communications system I referred to previously as two chunky chicken noodle soup cans is now two "Donald Duck Orange Juice" cans. Add to this all the static static that the weather was causing and you have some idea of what we were up against.

Our turn to the right was denied. The controller didn't want us near India's border and no amount of discussion about our navigation capabilities or abilities was about to change his mind. Choice number two was a 70 degree turn to the left to parallel the front, cutting back when we found a hole. We turned left, found the hole, finally cut back and requested a descent. The clouds were layered and we watched for the breaks to keep the rough spots to a minimum.

Not to change the subject, but at this point we should allow some time for discussion about "pucker factor." It's been said by many over the years that flying, especially in the heavies, is "hours of boredom punctuated by moments of sheer terror." I can lend my personal testimony to that feeling having flown over Hanoi during Linebacker II and more recently as a T-38 instructor pilot with "Bonzo the Great" as my student. (I never will understand how they wrote a manual that allows someone, with canned hams where his fingers should be, to perform something as delicate as formation flying with another aircraft two feet away doing five hundred miles an hour. The Marquis de Sade couldn't do better.) Getting back to the point at hand, pucker factor manifests itself in many different forms. The voice that once belonged to Frank Sinatra now belongs to Michael Jackson. The steel nerves of Superman are reduced to those of Don Knotts. The four-inch cushion that you were comfortably sitting on has mysteriously disappeared. Its whereabouts unknown, but you're positive it was there a minute ago and the pressure in your chest gives you a sneaking suspicion that you've really sucked it up hard this time.

Well, you get the general idea of how it was when the steward came over the interphone, and said, "Sir, we have an emergency. Would you please have an ambulance available on landing." On a medivac ship, this may be common, but on a normal passenger flight, it's not. No questions need to be asked. My steward knows his job and we were fortunate to have a doctor on board. Now, all I had to do was transfer my request to the tower who was now operating as our approach control.

"Islamabad Tower. This is Fox 227. I have a medical emergency and request an ambulance be available for our arrival. Requesting an immediate descent for a visual approach."

"Fox 227, Islamabad Tower...you... uh... say...gain."

The weather was playing havoc with his cans and strings.

"I say again. This is Fox 227 declaring an emergency."

"Roger...27...main...ten...sand...report... holding. Understand...dec...emergency."

"Islamabad Tower, Fox 227. You are coming in very broken. We have a medical emergency on board and are requesting an immediate descent and landing."

"Roger, Fox 227. Report over the field in holding. Descend and maintain 6,000 feet. The traffic ahead of you is leaving holding for the approach. You are number two for landing."

Obviously I wasn't getting across what I felt was the urgency of the situation because I had no intention of spending any time in the holding pattern. If any traffic ahead of me wasn't on the ground by the time I saw the field, he was going to be second. We began

to see breaks in the clouds and soon patches of the ground appeared.

"There's the field straight ahead," came a voice from over my shoulder.

"And there's our traffic," I said, "about five miles on final." He would be no factor, thank goodness.

"Tower, Fox 227 has the field in sight and we have the landing traffic. Request an immediate visual approach."

"Fox 227, Islamabad Tower. You're not in sight. Report over the field at 6,000 feet in holding."

"Pilot, steward. How soon till the blocks?"

His voice, filled with concern, told me I needed to get it on the ground now. "Ten minutes," I replied.

If we had to set up for the full approach over the field, it may be twenty minutes but I didn't tell him that.

"Islamabad Tower. Fox 227. We are descending at fifteen DME for a straight-in visual approach and landing."

By now, we were VFR and the civilian traffic we were following was on the runway. Before landing checks were completed I made my final call to tower.

"Islamabad Tower, Fox 227 is final approach fix, gear down."

"Roger, Fox 227. We have you in sight and you are cleared to land."

The landing on the heavily rain covered runway was thankfully uneventful. We did a one-eighty on the runway and taxied to parking.

"Fox 227. Islamabad Tower. Why did you not report overhead the field in holding as requested?"

I wasn't sure that VHF #2 was the appropriate place to get into a discussion with the tower on what I feel my priorities are when I declare an emergency. But I did inform him I'd talk to him after we parked. As we shut down, the steps rolled up and the ambulance promptly stopped at the bottom.

Happily for all, the patient recovered nicely. My subsequent talk with the tower centered on his ability to see my airplane vs. my belief in the urgency of the situation as I saw it and the need to be on the ground. We parted on a friendly note, although I'm sure neither side was convinced of the other's viewpoint.

Months later, as I sit back and reflect on the situation, I try to replay the flight to see if I could have done better. The weather was poor. We weren't in radar contact and radio communications were weak at best. All things considered, it wasn't anything unusual for many parts of the world. We—you and I—spend hours training for mechanical emergencies. We do our engine-outs, no-flap approaches and landings, etc. We don't, however, get to practice our in-the-weather medical emergency descent and landing. It's at those times that we really earn our pay. Maybe part of our preflight planning should include a little more thought on that big "what if" question during each phase of flight. Where am I? Where can I go? What can I do? When the big "what if" occurs, if we've thought of the questions beforehand, the answers should come easier.

Oh, by the way, I've decided to start a new charitable organization to promote better world communication and I thought you might like to contribute. It's called SCARE (Surely Cans Aren't Really Ears).

Major Zapalo is a 1969 graduate of Penn State University where he received his commission through ROTC. After graduation from UPT at Randolph AFB, Texas, he spent four years as a B-52 pilot at Fairchild AFB, Washington. From 1975-79, he participated in the SAC/ATC exchange program and flew T-38s at Columbus AFB, Mississippi. He is currently flying VC-135s with the 1st MAS, Andrews AFB, Maryland.

Sigonella, Italy

(elevation: 79 feet)

Sigonella NAS, 78 feet MSL, lies on the east coast of Sicily, 10 miles southwest of Catania. Terrain in the vicinity is mountainous, as evidenced by Mt. Etna, an active volcano, 21 miles north and rising to 10,920 feet MSL.

Since this is a Navy installation, there are numerous obstacles located near the runway which pose a definite hazard for MAC airlifters, such as optical landing systems (OLS) and radar reflectors. For the exact location of these obstacles, consult the FLIP Enroute Supplement and the 21st Air Force Summary of Airfield Restrictions.

Runways 28 and 10 are both precision runways. Runway 28 is equipped with British Calvert approach lights, REILs, and high intensity runway lights. Runway 10 has NATO standard approach lights, REILs, and HIRLs. Both runways have arresting gear for fighter-type aircraft.

For further information, review the Airport Qualification Program at your base learning center. If you note any needed changes, report them to HQ MAC/DOT.

—Adapted from ISD-Q6-436 (Sigonella)

At two miles to go to runway 28. Don't mistake the concrete taxiway to the right for the runway.

On short final to runway 28. High terrain in the background begins eight miles from the departure end.

On short final to runway 10. The Mediterranean is in the background.

C.R. TERROR

The Wounded Warrior wings a windmill taxi start.

Nice landing, Boss," remarked C.R. Terror's competent copilot on his mentor's grease job. "Why, I had to look out twice just to make sure we were down."

"You know, it's all in the wrist and, of course, keeping my steely baby blues riveted all the way to the end of the runway," touted the Sultan of Sink Rate. "Let's take 'er all the way to the end and really give our army troops a smooth ride," he said motioning toward the max load of green-suited persons in the rear. "Clear me right, Sam, and you're cleared on the 'almost done' checklist," continued Major T as he placed the semi-pointed end of the banana-colored Herk directly over the yellow taxi line.

"This has to be the proverbial armpit of the free world," Max Torque chimed in. "Hey, Boss, what da ya think about a crew day extension and let's press on to 'Dinero Grande' NAS.

"Fly the frag boys, fly the frag. Besides, there's a semi-decent club here," corrected C.R. "Okay, Sammy, run the 'quit' checklist and let's put one on the cuff lest we need a buddy start to fire up in the morning."

As the Hybrid of Herkdom descended the ladder, he could hear a heated discussion ensuing between Max and the marshaller. "What da ya mean *no* crew bus? Could you please call command post and request a crew bus? What da ya mean *no* command post? Hey, Boss, you ain't gonna believe this." C.R. waved his hands slowly in an effort to calm his engineer.

"No sweat, Max. Look at this as a chance to start our enhanced physical fitness program. Hey, Sammy, grab *our* bags and follow me to billeting." C.R. was ever the leader.

"Bu...bu...bu...Boss..."

"C'mon Sammy, time's awastin'."

"Trembling torquemeters, boys, these quarters are grim," C.R. groaned as he mopped his sweaty brow, exhausted from his trek to the BOQ.

"Hey, Boss, I didn't even know they *made* bunkbeds with three levels."

"Brown shoe days, Blinky. I remember walking five miles in the snow just to get to the chow hall. You boys have been spoiled. Well, a quick Flight Guard shower and it's off to the club for a Terrorific 'tini. Hey, Sam, throw my bags on the top bunk."

"Bu...bu...but Boss."

"Later, boys," he remarked as his feet whisked the Pudgy Pilot out the door.

Blinky turned slowly to Sammy and sighed dismally. "Sammy, I don't think this top bunk will hold Major Terror."

"You got a point there, Blinky. We better put him on the bottom. Besides, his climbing ability may be hampered later tonight."

"Good evening, young man. What time does the bar open?"

"Since 20 minutes ago, sir," the barkeeper said

without looking up.

"Well, I'll have a Terrorific 'tini. Nay, make it a double." C.R. was right at home in this bar, but that wasn't surprising. He was at home in *any* bar.

As the evening wore on, the small quonset-hut club began to fill with numerous revelers.

"C.R. Terror, you wild dog in the woods!" The Varmint of Vermouth swiveled around, hearing a familiar voice from his past.

"Freddie Flingwing, chopper pilot extraordinaire. You old veteran of vibration. How've you been m'boy? I haven't seen you since basic training. How's the world's second greatest aviator?"

"I've had my ups and downs," he replied, ignoring C.R.'s attempted put-down.

"There he is over there, Sammy," exclaimed Blinky, sighting C.R.'s gleaming pate from across the room.

"Hey, Boss, we're gonna head for some chow. Wanna come?" Sammy queried as they approached C.R.'s table.

"Not right now, boys, just met an old friend."

"Sure Boss. Oh, by the way, about the bunks..."

"Later, boys, later," C.R. interrupted turning back toward his long-lost friend.

As the hour grew later the drinks and the lies got bigger and bigger.

"Freddie, m'lad, it's been good, but it's off to the chow hall for the world's greatest aviator. Got to maintain my perfect carbo and vitamin levels, ya know."

"Wrong, turbo breath," chuckled Freddy, knowing the chow hall had closed over an hour ago. "Where da ya think ya are, McMac AFB? Waiter, bring us tee martunies. Just remember, C.R., a pork chop's worth of nutrition in every glass."

"Room 117, Room 117. Ah, here we are," mumbled C.R. as he made his way through the dimly-lit halls of the BOQ. He opened the door to total darkness and the unmistakable sounds of Blinky and Sammy operating in low-speed ground idle. "Ladder, where's the bloody ladder? Ah, ha. What a *mammoth* climb. Almost there, just get my... leg over the edge and...*OUCH!* Curses, either my head is bleeding or the ceiling is cracked. Well, here we go. One, two, three and alley oop...what the...?" *Cawakka!*

Amidst a cloud of dust came the sound of shattering bed slats, a terrified scream and then silence.

"What were you doing up there, m'lad?" C.R. asked, nursing the welt on his forehead, and pushing Blinky's foot out of his face.

"Well, you see, sir, ah, Sammy and I thought that you'd be, ah, more comfortable on the bottom bunk."

Suddenly, the Dumbfounded Duo was interrupted by the sound of a muffled scream from under the pile of broken slats and mattresses. "Quick, Blinky, we've made a Sammy sandwich. Help me with these mattresses."

The lumpy mattresses removed and the light turned on revealed Long Suffering Sam in a state of semi-shock with a mouthful of what appeared to be mildewed duck feathers.

"You alright m'lad?"

"Ye...ye...puff...Yes sir, I think so...ptuee!"

"Well, boys, let's get these mattresses spread out and get some crew rest. That bunk is obviously 'class-26ed!'"

As the sun broke over the rolling hills of "Armpit" AFB, a series of knocks came in rapid succession on the splintered door of Room 117.

"Huh, what, yeah, who knocks?" The semi-conscious C.R. asked, trying to return to the living and wondering which army had marched through his mouth during the night.

"It's Max, Major Terror. It's a little late, sir. Just wanted to make sure you guys were up."

"Oh, absolutely. We've been up for hours. Already ran a mile and a half and did 50 sit-ups," replied C.R., never at a loss for words and not letting the truth stand in his way.

"Yes, sir, well, we'll see you at the machine."

With great effort, the Terrorific Trio struggled into the vertical plane and were soon dressed, packed and heading for the whisper-prop.

"Morning m'lads, is the mighty Herk ready to fly?" C.R. coughed and wheezed as duck down swirled about him.

"Yes sir, ready to go," the crew chief replied, doing his best to suppress a snicker.

"Good. Let's fire 'em up and get out of Dodge."

Despite sore backs, a lack of sleep and a liberal dousing of duck feathers, C.R.'s crew was soon ready to start engines. The first three started flawlessly; however, as the number-one engine starter button was depressed, it became apparent that the starter was blown.

"Egads, gents, we've got a small problem here. Ya know, in the old days, Sammy, I woulda sent you out to prop this beast off. Well, m'boys, it's windmill taxi start time."

"Bu...but, Boss, we need a waiver to..." Sammy knew the regs, even if the Wizard of Windmills didn't.

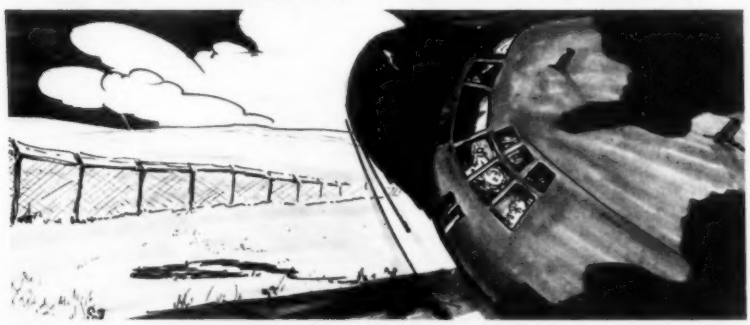
"Nonsense, Sammy. With my experience it would surely be approved, so why waste the extra time. After all, we're always getting lectures about judgment, and I plan to use some of mine right now."

The starter shaft removed, the Apostle of Asymmetry was now in position and ready to begin the high-speed taxi maneuver.

"Okay, gents, any questions?" asked C.R. simultaneously releasing brakes.

"But, Boss, shouldn't we refer to the Dash-One as a refresher before we..."

"Nonsense, time's awastin'! Power coming in. Warp factor one, Sam." C.R. was never one to over-brief a maneuver. The lame Herk slowly began lumbering down the runway. "Whoa, little too much asymmetric power, oops, too much rudder. Ya ha!" The Herky Honcho's hands and feet became a veritable blur.



Max Torque, unable to remain silent any longer, called, "Hey Boss, I think the nosewheel is skipping."

"You may be right, Max. Sammy, pull back on the yoke and get some weight off the nosewheel."

"But, Boss, if we raise the nose, we'll lose directional control and..."

"C'mon Sammy, no time to quibble," interrupted C.R., taking the yoke and raising the nose himself, not realizing the dangers involved with such a move. "Egads, boys. Hold on!"

As the nosewheel left the pavement, the Herk made an immediate 20-degree left face and headed for the toolies. "Thundering turbo-props, we're takin' off m'lads. Cage number-one, Sammy." C.R. exclaimed, realizing the Herk was departing the left side of the runway and heading for the GCA shack.

The staggering quad-prop finally got airborne, leaving in its wake several now-flattened runway lights and a horizontal three-thousand foot remaining marker.

"Major Terror, what happened?" asked Sammy, the Competent Copilot's eyes now the size of saucers.

"Well, had to be low-level wind shear, Sammy."

"Ya know, Boss, it sure wouldn't hurt for everyone to practice these uncommon maneuvers a little more often in training and *always* review the Dash-One before trying one."

"Sammy, m'lad, I've got the feeling we may all be seeing more of these unusual maneuvers *very* soon."

Quick Stoppers

Wheels of *Mis*fortune

It was another local trainer for the C-5 and its crew, with the standard mix of approaches, missed approaches and landings. In fact, the first three hours of the mission passed relatively quickly and uneventfully. But all that changed on the next touch-and-go when the crew of an aircraft on the ground saw the Galaxy's left two nosewheels depart the aircraft as it accelerated down the runway. After being informed of their problem, the C-5 crew consulted with standardization, then jettisoned fuel and made a careful landing, noting only minor control problems at slow speeds after landing. The cause of these wheels of misfortune? Apparently the wheels were not properly installed, an oversight aided by inadequate tech data covering both the installation and inspection of the wheels.

Another Birdstrike

Aside from damaging and destroying engines, birds can also inflict serious structural damage to aircraft. Take this C-130E on a night low-level training mission. Before flight, the crew had been briefed that migratory water-type fowl (namely ducks) could be in the area. Well, no sweat! After all, not too many ducks fly at night. Right?

Flying at 1,500 AGL, in visual conditions, the crew heard a popping sound under the flight deck. The number-one throttle moved forward one inch, then back to ½ knob-width forward of the original position. The crew shut down the number-one engine for a suspected throttle linkage failure and landed uneventfully back at the homedrome.

The maintenance troops found a six-by six-inch hole in the leading edge of the left wing between the engines. Imagine their surprise when they also discovered the braces inside the leading edge were dented, the piccolo tube was destroyed, one throttle cable was stretched and bent, and there was possible damage to the bleed-air duct.

Innocent Looking Cloud

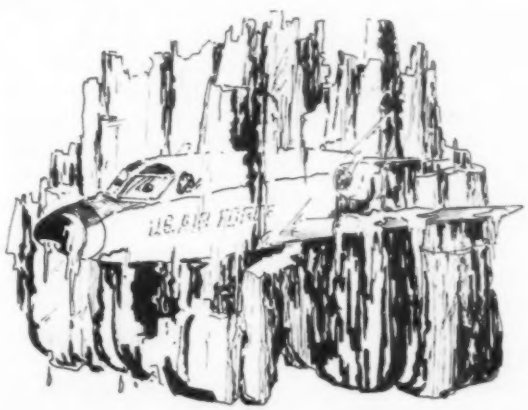
Don't trust innocent-looking, puffy white clouds. That's the lesson an overseas CH-53C crew learned the hard way last winter. It all started while the helicopter was cruising at 8,000 feet, in and out of scattered clouds. Noticing some light icing, the crew requested a descent and was cleared to 6,000 feet. Unfortunately, there were clouds at that level too, though not as many. Approaching one particular cloud, the crew calmly discussed its vertical development (almost none) and color (light) and determined it was not a hazard. So far, so good.

Convinced the cloud was non-hostile, the crew flew into it. But shortly after entering the puffy, they encountered additional icing from a heavy snow shower within it, so they requested a 180° turn and/or a descent. Before they could remove themselves from the not-so-friendly cloud, though, all four crewmembers saw a bright flash and heard a loud bang, followed by severe aircraft vibrations. At the same time, numerous caution and warning lights illuminated, so the crew initiated emergency procedures, lowered the gear, started the auxiliary power plant and began a descent. During the descent, the vibrations became so severe that flight instruments popped out of the instrument panels and electronic components in the aft radio rack broke out of their gimbal mounts.

Luckily the crew broke out of the clouds at 2,500 feet AGL and made a safe, power-on landing in a nearby cleared area. An investigation of this incident revealed the vibrations were caused by a failed tail rotor blade which had apparently been struck by lightning. So much for *innocent* clouds.

Airborne Glacier

An unfortunate encounter with inflight icing a couple of years ago cost a CT-39 two engines and a few tense moments. The mission, from the midwest to Hill AFB, Utah, was routine until approaching Hill, when the updated forecast called for light icing from 10,000 to 20,000 feet. Passing 20,000 on descent, the Sabreliner crew proved the accuracy of the forecast as they noted light icing. But things continued to deteriorate. As the CT-39 leveled at 12,000 feet, the previously light icing became moderate. The crew immediately requested a descent, but was held at 12,000 for 10 minutes due to conflicting traffic. Finally cleared to 7,000 feet, they noticed the significant ice accumulation began to fall from the aircraft at a fairly rapid rate as the aircraft passed through 10,000 feet. After completing a normal approach and landing, the crew had transient maintenance do an intake and FOD check, which was completed with no discrepancies noted. Upon arriving at their home base after another leg, the crew debriefed maintenance on the icing encounter and asked for a more thorough check of the engines. Maintenance complied and found damage to both engine's inlet guide vanes as well as first and second stage rotors and stators, requiring both engines to be replaced.



Pane-ful Experience

Twenty-five minutes into the flight of this CH-3, the engineer noticed the copilot's plexiglas sliding window panel had moved aft in the frame assembly and was bowed out into the windstream. Before the copilot could secure the window, the plexiglas panel and aft portion of the frame assembly departed the aircraft. Although the crew detected no unusual control inputs or vibrations that would suggest structural damage, they later found damage to four tail rotor blades and a tear in the pocket of one main rotor blade.

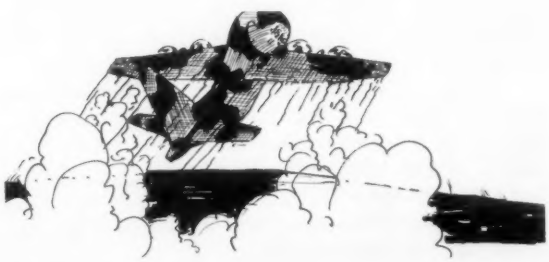
Apparently, the sealing compound used to hold the plexiglas panel in the frame had deteriorated and softened due to high ambient temperatures.

Cockpit Confusion

Confusion on the flight deck of a C-130H during a touch-and-go ultimately led to the overtorque of all four engines. The Herk was on a pilot proficiency sortie with a noncurrent aircraft commander in the right seat and an instructor pilot in the left.

After several successful 50 and 100 percent flap landings, the IP decided to let the AC try a no-flap touch-and-go. At a gross weight of 106,000 pounds, computed approach, threshold and touchdown speeds were 145, 135 and 117 knots, respectively. Threshold speed was wired and the landing was approximately 2,000 feet down the runway, about three knots hot. But at that point, the initiation of touch-and-go procedures seemed slower than normal. Finally, as the Herk approached the 3,000-feet remaining marker, the engineer, realizing no one had called for throttles, said, "Three thousand feet remaining, are we going to stop?"

The AC, confused by this, queried the IP and gave the impression he was going to retard the throttles into the ground range. The IP, at long last, took control of the aircraft, advanced the power, and lifted off with 1,500 feet remaining. As the dust began to settle, the engineer, hearing the engines wind up higher than normal, saw the torque readings pass 23,000 inch-pounds. The IP then pulled the throttles back to maintain torque below 19,600. The overtorque only lasted two or three seconds, but the maintainers still ended up removing and inspecting all four engines. Fortunately they found no damage to engines or components, but the results of this cockpit confusion could have been much worse.



After Deadlines

NIGHT HAWK MAKES FIRST RESCUE—An Air Force HH-60A Night Hawk currently undergoing testing at Edwards AFB, California, recently performed the first rescue credited to the new helicopter. The Night Hawk was operating out of Bishop, California, and was engaged in high altitude testing in an area called Coyote Flats at the 10,000-foot level of the Sierra Nevada mountains when it became involved in the rescue. A couple from Bellflower, California, was on a one-day fishing trip approximately five miles south of Coyote Flats when their truck broke down, stranding them overnight. The following morning they heard a helicopter and moved towards the sound. A chase helicopter involved in the HH-60A testing spotted the couple as they emerged from the woods, waving to attract the crew's attention. They radioed the situation to the Night Hawk crew, who responded to the couple's aid. According to Maj. Gerald L. Keyser, the Night Hawk pilot and the HH-60A Combined Test Force director, "The man and woman were very dehydrated and tired, and the man was suffering from a sprained ankle. They appeared to be very happy to see the helicopters." The Night Hawk transported the two back to Bishop where they received medical treatment and were reported in good condition. ASD/PA

COMBAT CONTROLLER WINS AFA AWARD—A combat controller from Hurlburt Field, Florida, was presented one of the Air Force Association's most prestigious awards, the Citation of Honor, at AFA's 38th National Convention in September. Honored for his role in the Grenada rescue operation, SSgt. Robert Griffin of Hurlburt's 1723rd Combat Control Squadron was notified of his selection in a message from David L. Blankenship, AFA president, which stated, "As a member of the combat control team, your personal courage and outstanding professional example during the successful Grenada rescue mission, proved essential to the success of the operation." During the rescue mission, Sergeant Griffin parachuted from the first aircraft at an altitude of only 500 feet. He was immediately exposed to small arms fire and returned fire while still airborne. After landing, Sergeant Griffin assisted several wounded military members and intentionally exposed himself to enemy fire in order to retrieve a fatally wounded member. The seven-year combat control team member received his award on 18 September in Washington, D.C.—MNS

C-5s HELP U.S. AEROBATIC TEAM TAKE WORLD MEDALS—MAC C-5s played a vital role in the 1984 World Aerobatic Championship held in Hungary recently. No, the Galaxies weren't performing outside loops and eight point rolls. Their mission was to transport the U.S. Aerobatic team and their nine aircraft from Dover AFB, Delaware, to Rhein-Main AB, Germany, returning them to the states after the competition. In previous years, the team's aircraft had to be disassembled and flown to the site of the competition in commercial aircraft. The time spent to reassemble the aircraft upon arrival cost the team members valuable practice time. But thanks to the C-5's cavernous cargo compartment, this time the nine planes traveled to Europe fully assembled. Upon arrival in Germany, the team members had only to refuel and fly to the competition location. With the C-5's assistance, the team won a gold medal in men's overall team competition, a silver in the women's overall team competition and an additional seven gold silver and bronze individual medals. The U.S. Aerobatic Foundation paid the government for the costs of the C-5 missions. Information courtesy of Lockheed-Georgia Company.

☆ U.S. Government Printing Office: 764-016/8